Collaborative Pattern Language Representation of Designs for Learning

OLA KNUTSSON & ROBERT RAMBERG
Department of Computer and Systems Sciences, Stockholm University, Kista, Sweden
{knutsson, robban}@dsv.su.se

Abstract

In the article we present how teachers by use of design patterns in a participatory design process have captured their experiences of using information technology in teaching. Focus in the design patterns shifted over time from focusing difficulties with technology and proposed solutions to these to didactic and pedagogical aspects of technology use in teaching and learning. A thematic analysis of the teachers' patterns and pattern languages building on the themes "context of the teacher", "context of the pupils" and "technology", is presented. Writing of design patterns helped teachers see relations and dependencies between problems and solutions that would otherwise be difficult to see while the writing of the design patterns simultaneously counted as doing designs for learning.

Keywords: designs for learning, design pattern, pattern language, participatory design

INTRODUCTION

Teachers are in their practice engaged in designs for learning making choices grounded in their teaching experience. These designs could be labelled well argued for and 'good' design solutions counting as examples of designs for learning (Selander 2008; Kress & Selander 2012). A design solution here means a solution to a 'problem' that a teacher has that includes making choices regarding didactics and the use of artefacts for solving the problem. Teachers strive towards overcoming difficulties and solving problems related to their teaching and it could be claimed that many problems already have a good design solution. However, an identified problem concerns the representation of these design solutions (Laurillard, 2008). Design solutions run the risk of becoming inaccessible to colleagues and the teaching community and thus taps into questions of sustainability of working design solutions. The broader question we approach in this paper is how the use of design patterns and pattern languages can support teachers´ capturing, organization, and communication of designs for learning? A more specific question concerns what designs for learning are expressed in the teachers´ patterns and pattern languages?

Representing designs for learning

In the Scandinavian participatory design tradition the concept of change not only denotes new designs and technology, but also change and development of human's' thinking, organisations and communities ways to work and deal with problems (Gregory, 2003). Work and research within participatory design use a range of techniques, methods and practices including different types of

workshops, design games, multimodal narratives, and constructions. By interacting and learning in each other's contexts a mutual understanding between designers and participants is developed (Muller, 2003). Involving people in design of processes and artefacts that concern them and their future use of these is central to participatory design (Muller, 2003).

Metaphors have in participatory design been used to establish a 'third space' between designers and users (Kensing and Halskov Madsen 1991; Muller, 2003). In interaction design there are different language oriented descriptions of interactive systems, for instance design patterns and pattern languages (Alexander, Ishikawa & Silverstein, 1977; Dearden & Finlay, 2006). Design patterns and pattern languages could form this third space between designers and users (cf. Muller, 2003). Different approaches to the use of design patterns and pattern languages for learning and how these can support the use of technology in schools is reported in the literature (Goodyear & Retalis, 2010; Mor & Winters, 2008). Much effort is invested in creating theoretically sound and pedagogically anchored design patterns and languages. However, the impact of these on everyday teaching practice has been questioned due to the level of abstraction expressed in such patterns and pattern languages (ibid.). The abstracted description needs to be translated into a concrete practice which poses a problem to the teacher. In approaching this problem, we choose to stay on the level of contextual descriptions as formulated by the teachers. Capturing teachers' design solutions in design pattern collections is not enough to capture and communicate their design knowledge. These need to be incorporated into a language increasing the communicative power. There is a need for a lingua franca for design – and we and many others claim pattern languages can provide just that (Erickson, 2000).

THE KISTA PATTERN LANGUAGE

The Kista pattern language developed over a period of 2 years where eight teachers participated in a participatory design workshop series. The teachers work at a primary school in the multicultural suburbs of northern Stockholm. Our design work started with a future workshop (Cerratto-Pargman et al, 2014; Knutsson & Ramberg, 2015), followed by six workshops focusing on design patterns and pattern language development to capture teachers' designs for learning. The design patterns were formulated by the teachers and our contribution was primarily presenting them with the concept of design patterns and pattern languages, facilitating the workshops and answering to questions as these occurred.

The design patterns and the recurring themes that were experienced to be central to their practice is presented below. The themes provide additional structure and communicative value to that of individual design patterns and were formulated as "context of the teacher", "context of the pupils" and "technology", with connections between these often facilitated by the use of technology (see figure 1).

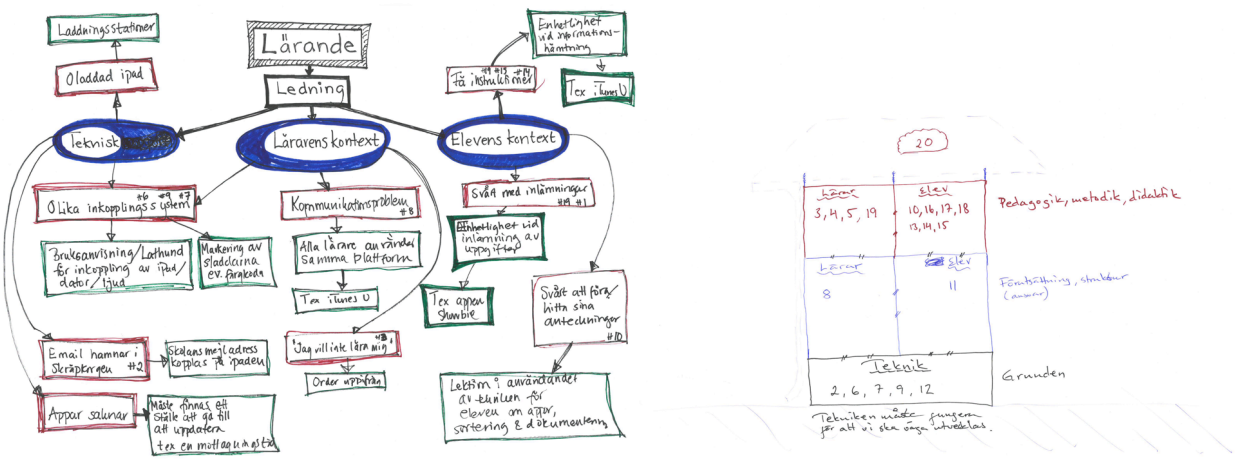

Figure 1: The teachers' pattern languages with the themes "context of the teachers", "context of the pupils" and "technology", in Swedish.

The vocabulary of the pattern language contains the individual design patterns; these could thus be seen as similar to the words of a natural language. The syntax of the pattern language builds on each design pattern being connected to at least one other pattern, but many being connected to one more abstract and one more detailed. The language has a hierarchal structure where patterns are connected in the form of a network.

In the following, we introduce the individual patterns through a thematic analysis building on Pattern Types (PT:s) as a way to navigate in the language as a network. A PT is defined as an abstract category showing the choices a user of the language has when choosing among the 28 individual patterns. The PT:s are described focusing the design solutions as formulated by the teachers.

PT1: DIGITALIZATION OF TEACHING MATERIAL - for documentation and re-use, including video recording of lectures.

- pattern#10: Increase the value of lessons by note taking
- pattern#12: Increase lecture sustainability by video recordings

PT2: DIGITAL LEARNING ENVIRONMENT – (VLE) to be used by all teachers. The main purpose is to push material and instructions to the pupils, and to collect the pupils' assignments in one place.

- pattern#1: Easy submission of students' works.
- pattern#2: One single e-mail address to be used
- pattern#8: Use the same general digital environment (VLE)
- pattern#16: Teach pupils how to use the digital environment
- pattern#21: Full use of the chosen general VLE
- pattern#27: Automatic app download, tablets should be the same for all
- pattern#28: Limit the number of channels for communication

PT3: OPEN CLASSROOM - communicative applications to open up the classroom physically and socially.

- pattern#17: Display of pupil's work in the classroom

- pattern#18: Make invisible pupils visible by communicative apps
- pattern#19: Share ideas and thoughts using virtual whiteboards
- pattern#20: Allow pupils to work outside the classroom using communicative apps

PT4: ROBUST CLASSROOM TECHNOLOGY - solutions for the physical classroom.

- pattern#6: Design and equip classrooms the same way
- pattern#7: One display solution in all classrooms
- pattern#9: Wireless connection of tablets for display
- pattern#11: Charging stations for the tablets
- pattern#22: Classroom manuals for the tablets
- pattern#23: Lending services for the pupils
- pattern#25: Lending of tablets

PT5: INSTRUCTION AND DOCUMENTATION TECHNOLOGY - teacher guided presentation, instruction and documentation of students' science labs.

- pattern#13: Use the projector and apps for instruction and documentation
- pattern#14: Use templates when documenting science labs
- pattern#15: Use push messages to improve instructions
- pattern#24: Develop genre specific texts

PT6: STUDENTS' DIGITAL ARENAS - learning and teaching in students' digital arenas.

- pattern#3: Share good examples to other teachers
- pattern#4: Place pebbles for learning on the pupils' paths
- pattern#5: Games as teaching tools
- pattern#26: Communicate with pupils through social media

By thematically structuring and connecting individual design patterns, interrelations between problems and solutions become visible and can therefore aid the teacher in doing and communicating designs for learning.

DISCUSSION AND CONCLUDING REMARKS

A language is used for describing things and events, for communication and exchange of ideas, artefacts, and etc. A 'natural' language grows when humans need to use the language to communicate and the same claim could be made about a pattern language – a pattern language must become 'alive' as Alexander puts it. If the goal is a hierarchal pattern language with a hierarchal structure, abstract patterns (categories) can be combined with concrete solutions. The language traverses from larger patterns describing e.g. a school, its environment and an assumed general pedagogy, to more concrete descriptions with detailed solutions to recurring problems. In 'natural' languages, words and phrases cannot be combined in any order, they need structure and sequence and the same line of reasoning applies to design patterns. The design patterns need to be organised as a language with a hierarchical structure and means for communication using different levels of abstraction.

Construction of design patterns could be seen as an activity striving to avoid re-inventing the wheel. In working with the design patterns and pattern languages the teachers reported seeing

relations and dependencies between problems and solutions that would otherwise be difficult to see. Other benefits observed were enabling keeping track of when and how a problem was solved and what new problems and possibilities this in turn gave rise to. The design patterns represent the teachers' design knowledge while these representations also count as resources for future design processes. This two-folded aspect of design patterns was pointed out by the concept's originators: Christopher Alexander and his colleagues (Alexander et al., 1977; Dearden et al, 2002), the pattern language works as a tool for design.

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